

This piece of software is developed by Handic Software AB, Stockholm Sweden

## CMB-64-STATISTIC-CASSETTE

The CBM-S. is a programmable read only memory consisting at assembler codes, which simplify your work with statistics and graphic displays. The CBM-S. will add 19 commands to your basic language. For example, bar charts (histograms) horizontally or vertically, plotting with 3871 points and hi-res 64000, printout of what is on the screen even if the screen is in graphic made (not the hires mode), statistical commands for calculations of, for example, mean value, standard deviation, variance, etc., etc.

# INSTALLATION

(1) Switch off your CBM.

(2) Place the CBM-S. cartridge in the appropriate slot.

(3) Check that all the cartridge are properly positioned.

Now you can switch on the power.

If everything is correct, your CBM will start by displaying a demonstration program.

In case of difficulty, switch off your CBM. Check that the cartridge is properly installed. Also make sure that the extra cartridge is not using the following addresses Hex:8000-9FFF DEC:32768-36864. The STAT-cartridge cannot be used with these accessories.

If difficulty persists return the cartridge to your Commodore dealer.

## STARTING THE CBM-64, STAT, CARTRIDGE

In the demonstration program you will find these instructions:

F1 = BASIC + STAT

F3 = BASIC

F1 means the key marked "F1". By pressing this key the demonstration program will be stopped and your CBM is ready for programming.

The STAT-CARTRIDGE is activated and awaits your commands.

The key "F3" has the same function as "F1" except in activating the STAT-CARTRIDGE. This means that statistical commands for the STAT-CARTRIDE when used in your program will give you a SYNTAX ERROR reply.

The STAT-CARTRIDGE can be started manually by typing the following: SYS 32483 and pressing the <RETURN> key.

If everything is correct, the lowercase (small letters) should now be in uppercase (capital letters) while the uppercase should now produce graphic characters. This is CBM in its GRAPHIC MODE. This to give the graphic diagrams and histograms or bar-chart that you display the same look as they normally do on paper. You can also use the other mode i.e. the TEXT MODE. Now try these two modes on your own.

The above mentioned can be tested by typing.

PRINT CHR\$(142) < RETURN>.

To return to TEXT MODE by typing:

PRINT CHRS(14) < RETURN>.

Please note that the above two commands can be used whenever you want to.

For example,

10 PRINT CHRS(142) : rem GRAPHIC MODE

20 @SCALE,3,5 : rem print a scale

30 PRINT CHR\$(14) : rem back to TEXT MODE

#### COMMANDS IN GENERAL

In order not to make the normal basic routines slower, a control of special characters has been added. It tests to see if whether the first character in a command has the special character "@".

All the commands can be used as a direct command (without line numbers) or in a program (with line numbers).

NOTE! Eleven variables are used by the STAT-CARTRIDGE. They are: MV, SD, VA, ZP, GC, SC, CC, ES, LC, MI, MA.

Do not use these variables other than as described in the manual as long as the STAT-CARTRIDGE is in use.

All commands have input checks for proper input. If the input value is higher than normal a reply of "ILLEGAL QUANTITY ERROR." will be seen on the screen.

A syntax control of all commands is of course also included. If you make a spelling misstake the CBM will reply "SYNTAX ERROR."

If you, for example, get "DIVISION BY ZERO ERROR IN 20" and line 20 is 20 @LINREG. A, 223, please check your input data (matrix) for the wrong value.

As described earlier in using the command a fixed value is given XXX,5,8. This can be replaced by a variable name such as XXX,a,b and so on.

Ex: 10 FOR T=1 TO 10 20 @PLOT,T,5 30 NEXT T

This will give you a horizontally straight line 5 steps from the top row. A good idea is to use the normal variables x and y.

ex. 20@PLOT,x,y.

The best way of using this aid is by:

(1) Loading data into a matrix. Ex.( A(1)-A(max) ).

Doing calculation (with or without S-CMD's).

(3) Adjusting the results to the acceptable levels for the cartridge.

(4) Having printauts or graphic displays on your printer.

#### COMMANDS

KILL

Maybe not the best command to start with, anyhow its function is to restore the CBM to its original status i.e. as before the S-circuit was activated. This command will not erase any program which you might have stored in your CBM.

SYNTAX: @KILL

#### PLOT- (a)/(b)/(k)

All plotting commands test that the actual point desired is on the screen before plotting. If there is any text on the screen, it wan't be written over (only plot symbols).

PLOT This will help you to plot and draw graphs on the CBM screen, the screen now contains 3871 paints (79\*49).

SYNTAX: @PLOT,x,y X=0.79 Y=0.49

PLOTD This command will switch off a specified point on the screen.

SYNTAX: @PLOTD,x,y X=0-79 Y=0-49

NOTELD="DELETE"

PLOTC The command tests if a specified point on the CBM screen is on or off, SYNTAX: @PLOTC,x,y X=0-79 Y=0-49 You can get the answer by typing peek(828) (1)=on, (0)=off NOTELC="CHECK"

PAPER This command copies what is on the screen of your CBM on to paper. It can be used for almost any other printouts that you might want, other than the S-cartridge's graphics.

NOTE! Hires screens can NOT be copied.

SYNTAX: @PAPER, TR, BR, LC, RC

Where: TR = Top-row (start) 1-24

BR = Bottom-row (stop) 24-0

LC = Left-column 0-39

RC = Right-column 39-0

With this command you can control the type of printouts that you want, the whole screen or just a specified part of the screen.

If you wish to copy the whole screen, just write:

@PAPER

If you wish to add comment to the grahpic picture, use the programmable-cursor positioner.

Ex: print cursor home (Given start position)
print cursor dawn (no. of times dawn)
print cursor right (no. of times right)
print "TEXT"

This can be done in one string (see examples on page 10).

# BARCHART

When the bar command is given, only one bar will be printed either horizontally ar vertically. If you wish to add more bars to the same bar-chart, repeat the command with the new position and data. You can put bars in whatever order you want and wherever you like. It is possible to add bars, place them next to each other etc, etc. On giving the bar-command a scale will be drawn, if no scale has been given, the scale will have the value 5,5 i.e. every mark has the value of 1. More about scales later.

BARV Means BAR-CHART VERTICALLY (bottom to top). Here you must specify three variables. SYNTAX: @BARV,A,B,C

Where: A = START POS. 0-38 B = STOP POS. 0-38 C = HIGHT 0-23

Ex: @BARH,0,5,8

BARH As above except that it will be printed horizontally (left to right). Here you have to specify only two variables. NOTE! The length of the bars can be much longer but the width of the bars cannot be varied as in BARV.

SYNTAX: @BARV.A.B

Where: A = ROW 0—19 (Start at home.) B = LENGTH 0—37 (Length or hight)

Ex. @BARV,1,20

SCALE This command gives you an indexed L-sharped scale in column 0 and row 24. Its default value = 5, i.e. every mark on the scale is equal to one. This command is also useful with plotting routines.

SYNTAX: @SCALE,H,V

Where: H = Index on the horezontal scale 0-35 V = Index on the vertical scale 0-24

Ex. If the index value is 10, on every fifth mark the values 10,20,30,40,50,60,70,80 etc, etc will be written.

Ex. @SCALE,1,8

As mentioned earlier, if you wish to change the index of an existing 'picture' the command scale is repeated one more time but with the correct values.

If you only wish to use one of the two scales, the unwanted scale should be given the value '0'.

Ex. @SCALE.0,5 This gives only a vertical scale.

COLR With this command you have the possibility of control the colours of the graphic display, background and text. SYNTAX: @COLR,G @COLR,G,S or @COLR,G,S,T Where G = colour of the graphic display: scales, bars, plot, points, etc, etc. NOTE! Doesn't change the colour of the text.

G = 0-15 (CBM's primary colours) see page 11

S = Screen colours 0—15 (Background). This value does not have to be given every time a colour is chosen, only when a new background colour is required. All colours-codes are found on page 11.) NOTEI boarder-colour 0—15 use POKE 53280,??

T = Text colour 0—15. Does not have to be given in every colour command.

## COMMANDS FOR STATISTICS

To use these commands a matrix is built up in the EBM's memory. And because of this the matrix has to be dimensioned. Note! The matrix should be dimensioned to fit at least the amount of data that you will be working with. The name of the matrix MUST be a ONE character name e.g. 'A' and not 'AB', X(0) is not used in stat-commands. Statistics can be calculated in two different ways: Grouped or ungrouped. Ungrouped data are not put in special order in the matrix, while grouped data are put in sequential order.

Example. PERSON:	David	John	Bill	Peter	Adom	Edward
GROUPEDLENGTH:	A(1)	A(3)		A(7)		
DATA HEIGHT:	A(2)	A(4)	A(6)	A(8)	A(10)	A(12)

QUA or QUAntity in this case will be 12.

STAT Mean value Standard deviation Variance.

(a) Population = STATP, X, Quantity. (b) Sample = STATS, X, Quantity.

SYNTAX: Ex: @STATP.A.25

This means calculating according to the population-method of matrix A(1) to A(25).

The answers to these calculations are given in the variables MV, VA, SD.

Where: MV = Meanvalue

VA = Variance

SD = Standard deviation

EX: 10 DIM A(10) : rem reservers place for 10 bytes 20 FOR X=1TO10 : rem Notel Starting at A(1)

30 INPUT "data": A(X) : rem fetch data . . .

40 NEXT X

50 @STATP,A,10 rem calculating stat.

60 PRINT "meanvalue=";MV : rem printing of the results

70 PRINT "standard deviation=,5D

80 PRINT "variance=";VA 90 REM ev diagram ???

Please note that the variables MV, SD VA should not be used when you intend to use statistical commands in the program you are writing.

## REGRESSION/CORRELATION/MINMAX/SORTING

LINREG LINEAR-REGRESSION can be calculated by using a one dimension matrix. SYNTAX: @LINREG.X.QUA.

Where X = matrix name

QUA. = amount of data to be calculated in the matrix

Ex. @LINREG,A,123

The answer will be given in the following variables ZP, GC, SC, CC, ES.

NP = Zero point

GC = Gradient coefficient SC = Safety coefficient CC = Correlation coefficient

ES = Calculate the Standard/deviation of estimate.

LINKO LINEAR-CORRELATION can be calculated by using a one dimension matrix. SYNTAX: @LINKO,X,QUA. Here like the one above A = Matrix name.

and QUANTITY = amount of data to be calculated.

Ex. @LINKO,A,456

The answer will be given in the variable LC (linear-correlation).

MINMAX This command is used when you want either the LOWEST or the HIGHEST values of a one dimension matrix. SYNTAX: @MINMAX.X.Max-QUA.

Note! The command sorts your matrix in increasing sequence.

Ex. @MINMAX,A,135

The answer will be given in the variables MI and MA.

MI = MIN value MA = MAX value

Sorting the data in a matrix in an increasing number sequence. The matrix must be dimensioned before a routine can call on the matrix. The most suitable approach would be to sort the matrix in the beginning of the program.

If more than one matrix is dimensioned in your program THE ONLY ONE TO BE SORTED IS THE FIRST DIMENSIONED.

Sort X(1)—X(max). SYNTAX: @SO,QUA.

QUANTITY = Max amount.

NOTE!! EVEN STRINGS CAN BE SORTED IN ALPHABETICAL ORDER.

GROUP CLASSIFICATION can be easily arranged by using a FOR/NEXT loop after sorting. The FOR/NEXT loop will take out every tenth value from the matrix.

Ex. 10 DIM A(100) : rem dimensionering 20 @SO,A : rem sorting

30 FOR X = 1 TO 100 STEP 10 : rem fetch every 10th 40 PRINT A(X) : rem write every 10th

40 PRINT A(X) : rem write every 10th 50 NEXT X To calculate a straight line to a given set of coordinates useing the method of least squres, here is an exemple. The table below shows the hight and weight of 11 male students. We will now find out what a normal student should weigh it his height is between: 70—72 ins.

Table:											11.
(X) Height	71	73	64	65	61	70	65	72	63	67	64
Y) Weight	160	183	154	168	159	180	145	210	132	168	141

The curve can be expressed by the funktion F(X) = NP + (LK \* X)

Program example: 5 REM input of data 10 DIM A (25) 20 FOR N = 1 TO 22 30 READ B : A(N) = B 40 NEXT N 50 REM Calculating the curve 60 @LINREG, A, 22 : REM 2\*11=22 70 PRINT"F(X)=";ZP;"+(";GC;"\*X" BO PRINT 'Coefficient of determination=":CD 90 PRINT"Coefficient of correlation=";CC 100 PRINT Standard error of estimate=":ES 110 PRINT 120 REM person example 130 INPUT "X= ":X 140 Y=ZP+GC\*X REM interpolation 150 PRINT"Y= ":Y 160 GOTO 130 170 REM data.NOTEL THE DATA SEQUENSE 300 DATA 71,160,73,183,64,154,65,168 310 DATA 61,159,70,180,65,145,72,210 320 DATA 63,132,67,168,64,141

RUN
F(X)=-106.79174+(4.04722332\*X)
Coefficient of determination= .556260344
Coefficient of correlation= .745828629
Standard error of estimate= 15.4134848
X = ₹70
Y = 176.513892
X = ₹72
Y = 184.608339

### PROGRAM EXAMPLE

10 DIM A(15) : PRINT CHRS(147)

20 PRINT "collecting data"

30 INPUT "How much data shall be saved?":MAX

40 FOR X = 1 TO MAX

50 INPUT data: "DA

60 A(X)=DA

70 NEXT X : PRINT CHRS(147)

80 PRINT "all data has been saved" 90 :

100 @SO.A,MAX

110 FOR X = 1 TO MAX : PRINT A(X)

NEXT X

120 ±

130 @MINMAX,A,MAX :PRINT min-

data= ";MI

140 PRINT max-data= ";MX

150 @STATP,A,MAX : PRINT" mean value= ":MV

160 PRINT'standard devation= ";SD

170 PRINT "VARIANCE= ";VA

180 FOR X = 1 TO 2500: NEXT X

190 REM \*\*\* graphic \*\*\*

200 A=5: B=9: F=1

210 @COLR,0,F

220 @BARV,1,2,A

230 @COLR,2 240 @BARV,3,4,B

250 END

#### Comments:

clear the screen write title

type in max amount of input loop for input accept data until a(x), save data in matrix "a" max data — clear screen

command for sorting

write out the whole matrix "a"

command for min & max. write out the result of max

command for statistics p. write the result. write the result. "wait" loop

determine the bar height & colour graphic=black colour=0 bar 1=black. graphic=red bar 2=red.

# **TEXT ON GRAPHIC PICTURES:**

10 @BARV,2,3,5

20 @BARV,11,12,10

30 PRINT'SQQQQQQQQQQQQQ

QQ)) YOURS"

40 PRINT"SQQQQQQQQQQQ()))))))))

MINE"

50 GET AS : IF AS = " " THEN 50

60 END

Example: "SQQQQQQQQQQ)))))) text" S=CRSR HOME (The given starting place)

Q=CRSR DOWN |=CRSR RIGHT REM CREATE 2 BARS

REM YOURS=TEXT FOR BAR 1

:REM MINE=TEXT FOR BAR 2

REM wait loop.

# COLOUR COMMAND

DATA FOR COLOUR COMMAND #COLR,G,S,T G=GRAPHIC S=SCREEN (Background) T=TEXT (Basic)

G,S,T -VALUE	Lt-colour ref.
0 = BLACK 1 = WHITE 2 = RED 3 = CYAN	(10)
4 = PURPLE 5 = GREEN 6 = BLUE 7 = YELLOW	(13) (14)
8 = ORANGE 9 = BROWN 10 = Light RED 11 = GRAY 1	(2)
12 = GRAY 2 13 = Light GREEN 14 = Light BLUE 15 = GRAY 3	(5) (6)

For BOARDER-COLOUR use:POKE 53280,77
?? = 0—15 of codes above.

IN HIRES MODE:

@COLR,G,S,T works like

G = Background (HIRES). CHANGED II
S = Background (basic). Not changed
T = Text (basic). Not changed

#### HIGHRESOLUTION GRAHPIC

Following command works in high resolution.

@GRAPHIC Select high-resolution memory top.
 @HPLOT,X,Y Plot a specified point in hires.
 Delete a specified point in hires.

@HSAV Dont clear hires screen, you might add paints.

@HDEL Clear the hi-res screen.

This set of command givs you high-resolution platting facilities, 200°320 points plus the normal commands for CBM-STAT.

NOTE! If you dont want to use high-resolution grahpics then you dont have to use command@graphic,all commands before this page will work just as

normal.

The first command after "F1" (select STAT+basic) should always be "@GRAPHIC". This command checks memory and adjust pointers to there new locations. This command should never accour in a basic line because then the program it is in will be erased. Type it as a direct command. When you give the @HPLOT or @HPLOTD command the screen turn into hiresmode (no text just dats) this makes it impossible to read error messages that might accour. If you suspect that an error has been found you can restore the normal basic text by two ways 1. blindtype #HDEL (hires-delete) or @HSAV (hires-save) finish with a RETURN 2. Use STOP+ RESTORE, in this case use @HDEL ar @hsav commands after to restore hires-pointers. If you give the incorrect values to @HPLOT or @HPLOTD the result will be an ILLEGAL QUANTITY ERROR I When this accour you will automatically be switch back to basic-made.

Note max. X-Value is 0-319 and max. Y-Value is 0-199.

Example: 10 B=1 :C=1 :REM BOARDER

20 GOSUB 100

30 B=2:C=5 :REM SCALE

40 GOSUB 100

50 @HSAV REM SAVE HIRES.

60 END

100 FOR Y = 0 TO 199 STEP C

110 @HPLOT,B,Y

120 NEXT Y

130 FOR X = 0 TO 319 STEP C

140 @HPLOT,X,B

150 NEXTX

160 RETURN

This gives you an L-sharped boarder with a mark at every 5th point.

## Background colour:

To change background colour in hires use @COLR, G, B, T. The G variable is used for the background colour, (this only in hires). Whenever you leave the hires screen the G variable works like normal again.

#### HELP IN CASE OF PANIC

- (A) You are in HIRES-mode and nothing happens. (You might have touched the STOP-key).
- 1. Push RUN/STOP and RESTORE at the same time.
- 2. Type @HDEL or @HSAV + RETURN
- 3. Type LIST + RETURN . . . OK.
- (B) When the screen shows the basic text reversed (white text/black background) instead of hires.
- 1: type @HSAV or @HDEL + RETURN to restore pointers.
- 2: Run the program again.
- Notel this is one way to see the error messages that might accour.
- (C) Hires-commands responds with SYNTAX ERROR!
- 1: Be sure that you gave the @GRAPHIC command.

Please note that the resolution of the TV-screen (when using RF-modulator) is decresed compared to a videomonitor. This might cause that a single line in hires is invisible. In this case try to write dubble lines, (in paralell).

